

ABSOLUTE VALUE

$$|-5| = 5 \quad |x| = 5$$

$$|4| = 4 \quad \swarrow \searrow \quad x=5 \text{ or } x=-5$$

$$|-3| = 3$$

$$|x+3| = 5$$

$$\begin{array}{lcl} \swarrow & & \searrow \\ x+3=5 & & -(x+3)=5 \\ x=5-3 & & x+3=-5 \\ x=2 & & x=-5-3 \\ & & x=-8 \end{array}$$

$$|7x+1| = 9$$

$$\begin{array}{lcl} 7x+1=9 & & -(7x+1)=9 \\ 7x=8 & & -7x-1=9 \\ x=\frac{8}{7} & & -7x=10 \\ & & x=-\frac{10}{7} \end{array}$$

TRY

$$1.) |x+7| = 4$$

$$2.) |3x-5| = 7$$

$$3.) |-6x+7| = 8x$$

$$4.) 3|x+4|-3 = 7|x+4| - 8$$

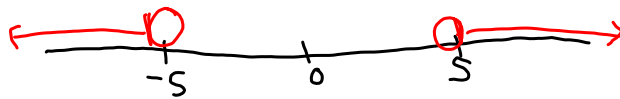
$$5.) 2|x+6| = -2$$

A slight bit harder

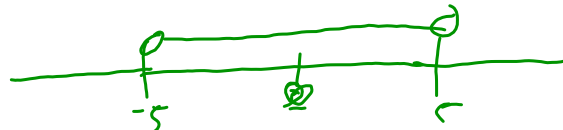
Inequalities "alligators"

$<$ Less than
 \leq Less than or equal to
 $>$ greater than
 \geq greater than or equal to

$$|x| > 5$$



$$|x| < 5$$



TRY

$$1.) |2x| > 6$$

$$\begin{aligned} 2x &> 6 & -2x &> 6 \\ x &> \frac{6}{2} & x &< \frac{6}{-2} \\ x &> 3 & x &< -3 \end{aligned}$$



$$2.) |-3x| < 9$$

$$3.) |x+7| > 3$$

$$4.) |2x+7| < 0$$

$$\begin{aligned} -3x &< 9 & -(-3x) &< 9 \\ x &> \frac{9}{-3} & 3x &< 9 \\ x &> -3 & x &< 3 \end{aligned}$$



$$\begin{aligned} x+7 &> 3 & -(x+7) &> 3 \\ x &> 3-7 & x+7 &< -3 \\ x &> -4 & x &< -3-7 \\ & & x &< -10 \end{aligned}$$



$$4.) |x| \neq \text{Neg}$$

∴ No Sol'n

FACTORING REVIEW

1.) $2y^3 + 8xy$

7.) $x^2 - 4$

2.) $5x + 10y - 15xy$

8.) $12x^2 - 27$

3.) $5x + 15 + xy + 3y$

4.) $y^2 - 3y + yz - 3z$

5.) $x^2 - 8x + 15$

6.) $x^2 - 8x + 7$

Difference of Squares

$$A^2 - B^2 = (A - B)(A + B)$$

ex $x^2 - 36$

$\sqrt{x^2} = x \quad (x + 6)(x - 6)$

$\sqrt{36} = 6$

Difference of Cubes

$$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$$

ex $x^3 - 27 = (x - 3)(x^2 + x(3) + 3^2)$

$\sqrt[3]{x^3} = x \quad = (x - 3)(x^2 + 3x + 9)$

$\sqrt[3]{27} = 3$

$$x^3 - 64 = (x - 4)(x^2 + 4x + 16)$$

TRY:

1.) $x^3 - 125 = (x - 5)(x^2 + 5x + 25)$

2.) $27x^3 - 64y^3 = (3x - 4y)(9x^2 + 12xy + 16y^2)$

3.) $2x^3 - 54$

4.) $(x - 1)^3 - (x + 7)^3$

5.) $(2x)^3 - 8y^3 = (2x - 2y)(4x^2 + 4xy + 4y^2)$
 $= 2(x - y)(4x^2 + 4xy + 4y^2)$
 $= 8(x - y)(x^2 + xy + y^2)$

4.)
$$\left[(x - 1) - (x + 7) \right] \left[(x - 1)^2 + (x - 1)(x + 7) + (x + 7)^2 \right]$$
$$(x - 1 - x - 7) \left[x^2 - 2x + 1 + (x^2 + 6x - 7) + (x^2 + 14x + 49) \right]$$
$$(-8)(3x^2 + 18x + 43)$$

LONG DIVISION

$$\begin{array}{r}
 \text{65} \\
 7 \overline{) 456} \\
 \underline{6 \times 7 \quad -(42)} \downarrow \\
 36 \\
 \underline{5 \times 7 \quad -(35)} \\
 \hline
 1 \text{ Remainder}
 \end{array}
 \Rightarrow 456 \div 7 = 65 \text{ R}1$$

$$\begin{array}{r}
 1233 \\
 8 \overline{) 9870} \\
 \underline{-(8)} \downarrow \\
 18 \\
 \underline{-(16)} \downarrow \\
 27 \\
 \underline{-(24)} \downarrow \\
 30 \\
 \underline{-(24)} \\
 6
 \end{array}$$

$$\begin{array}{r}
 x+6 \\
 x+1 \overline{) x^2+7x-9} \\
 \underline{x(x+1) \quad -(x^2+x)} \downarrow \\
 6x-9 \\
 \underline{6(x+1) \quad -(6x+6)} \\
 \hline
 -15
 \end{array}$$

$$\begin{array}{r}
 4x^2+8x+21 \\
 x-2 \overline{) 4x^3+0x^2+5x-7} \\
 \underline{-(4x^3-8x^2)} \downarrow \\
 8x^2+5x \\
 \underline{-(8x^2-16x)} \downarrow \\
 21x-7 \\
 \underline{-(21x-42)} \\
 \hline
 35 \text{ Remainder}
 \end{array}$$

$0x^2$ is a
place holder
so we have
like terms

SYNTHETIC DIVISION

$$(x^2 + 5x - 7) \div (x + 1)$$

To find number on outside of L
take $x + 1 = 0$
 $x = -1$

Set up the L

	1	5	-7	
-1	↓	-1(1)	(-1)(4)	← coefficients from question
		= -1	-4	
	1	4	-11	← coefficients with degree 1 less than question
			remainder	

(1st # just drops down)

$$(x + 4) R - 11$$

ex2 $(3x^3 + 5x^2 + 4x - 7) \div (2x - 1)$

$$2x - 1 = 0$$

$$2x = 1$$

$$x = \frac{1}{2}$$

$\frac{1}{2}$	13	5	4	-7
	↓	$\frac{13}{2}$	$\frac{23}{4}$	$\frac{39}{8}$
	13	$\frac{23}{2}$	$\frac{39}{4}$	$-\frac{17}{8}$